Robbers Creek Watershed Restoration Project
Proposed Action Purpose and Need

The USDA Forest Service, Lassen National Forest (LNF), Almanor Ranger District (ARD) is proposing management activities on approximately 4744 acres within the Robbers Creek Watershed Restoration Project (hereafter, Robbers Creek Project). The project goals include promoting healthy, diverse, fire-resilient forests and restoring meadow and aspen habitat form and function. In addition, this project would address the existing transportation system and hazardous fuels along a Pacific Gas and Electric Transmission powerline.

Project Location

The Robbers Creek Project is located entirely within the Swain Management Area on the Almanor Ranger District (Figure 1). The project encompasses approximately 10 miles of Robbers Creek within the Upper North Fork Feather River Watershed. The southern extent of the project boundary is located approximately 2.5 miles north of Westwood, CA on Lassen County road A-21 and extends north to Barnes Flat (see map 1 and 2 of 4). The project is primarily within Lassen County with a small portion in Plumas County.

The project area would encompass all or portions of Township 30 North, Range 8 East, Sections 7, 9, 15, 16, 17, 18, 22, 26, 27, 34, and 35; Township 29 North, Range 8 East, Sections 1, 2, 12, and 13; and Township 29 North, Range 9 East, Sections 6, 7, 18, 19, and 20 Mount Diablo Base Meridian (MDBM) (Figure 1). Maps showing the proposed treatment locations are available on the project website:

http://www.fs.usda.gov/projects/lassen/landmanagement/projects

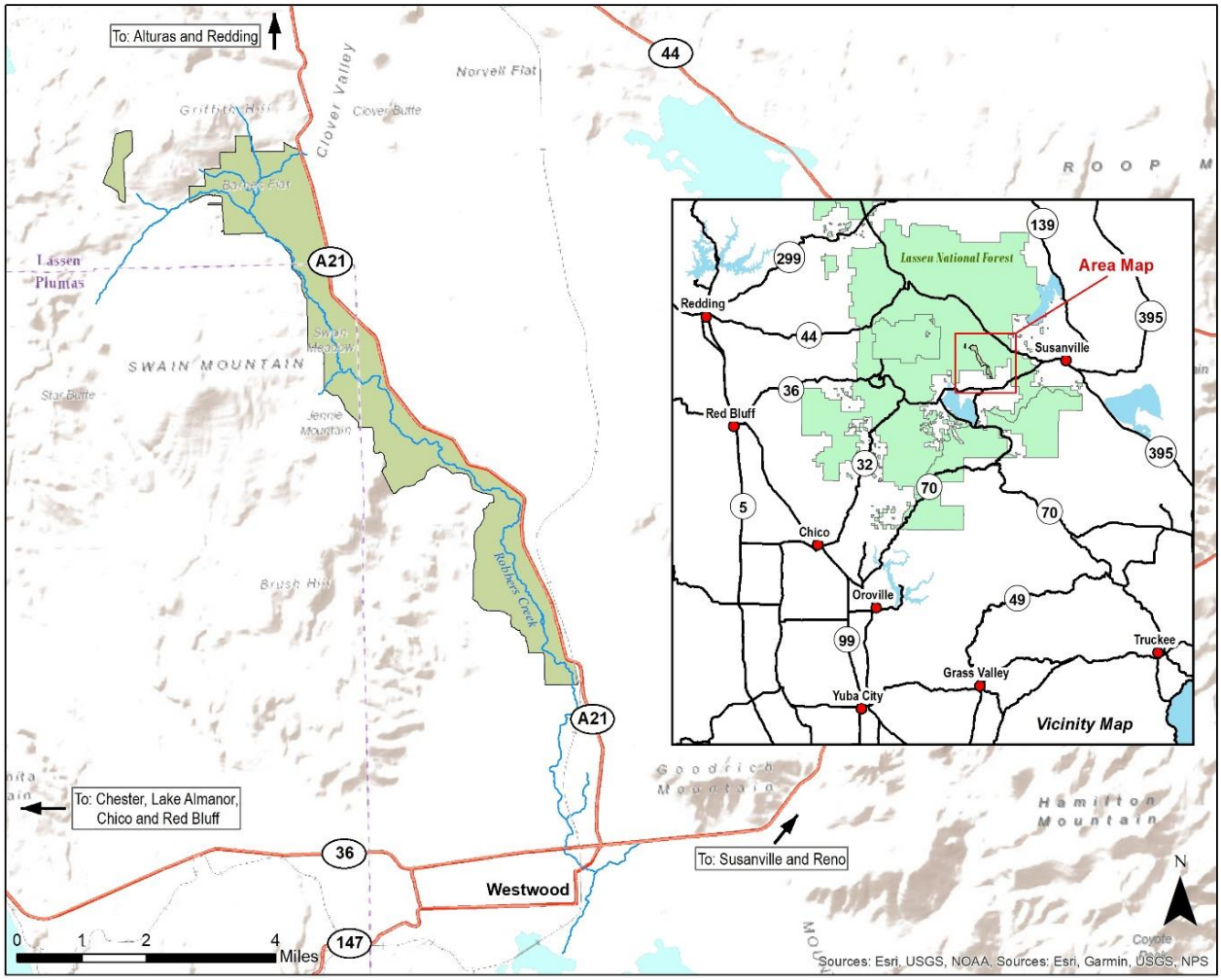

Figure 1: Robber's Creek Project area overview map.

Need for the Proposal

The Robber's Creek Project is being developed as a pilot public-private partnership to increase the pace, scale and efficacy of watershed restoration in the Sierra Nevada. The Almanor Ranger District is collaborating with the South Lassen Watershed Group, through a California Climate Investment grant from the California Department of Forestry and Fire Protection (CALFIRE), to develop this project. The purpose and need and proposed actions presented here were developed by the Lassen National Forest in collaboration with The Sierra Institute for Community and Environment, Point Blue Conservation Science, and Forest Creek Restoration. Multiple field trips, workshops, and meetings have been convened with this team to evaluate the need and develop project objectives.

The Robbers Creek Project objectives are to restore watershed health that improves the ecological resilience of aspen, meadow, stream and forest habitats. These objectives are designed to be consistent with the 1992 Lassen National Forest Land and Resource Management Plan (LRMP) and 1993 Record of

Decision (ROD) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Final Environmental Impact Statement and ROD (2004), and the Management Indicator Species Amendment (2007) and aligned with the goals from the Region 5 Ecological Restoration Leadership Intent (USDA 2011).

The Lassen LRMP also addresses the need to support local rural communities by providing a wood supply for local industry and sustaining a part of the employment base in rural communities (LRMP p. 4-2, 2004, 2004 SNFPA ROD p. 9, USDA 2011). Where consistent with desired conditions, treatments proposed for the Robbers Creek project would be designed to be economically efficient and meet multiple objectives (SNFPA ROD p. 35, 48). This project has five purposes:

1. Improve the health and resiliency across the landscape of upland conifer forest, riparian, aspen and meadow communities.
2. Reintroduce fire into a fire-adapted ecosystem.
3. Restore the hydrologic function of Swain meadow.
4. Provide an efficient transportation system that meets resource management needs while reducing adverse ecological impacts associated with roads.
5. Reduce hazardous fuels along PG&E transmission powerline

Purpose and Need 1: Improve the health and resiliency across the landscape within upland conifer forest, riparian, aspen and meadow communities.

Existing Condition:

Past management and the reduction of fire as an ecological process, in a disturbance driven landscape has altered forest structure and succession in the Robbers Creek project area. Fire Return Interval Departure (FRID) data shows that the pre-settlement vegetation community maintained by the historic fire regime within the project area was primarily characterized as dry mixed conifer/yellow pine (49%), lodgepole pine (18%), and moist mixed conifer (13%) with remaining areas characterized as various shrub communities (~5%) and minute inclusions of other forest communities (<2%). Prior to active fire suppression the mean fire return interval for dry mixed conifer/yellow pine was 11 years (Table 1). In contrast, the current fire return interval is 111 years for 89% of the project area (Table 2), demonstrating a strong departure from historic fire return intervals. The lack of fire across the landscape has caused an increase in forest density, a compositional shift to more shade-tolerant tree species, a loss in irregular tree patterns, and an accumulation of fuels.

Table 1: Pre-settlement fire regime by acres in the Robbers Creek project area. *

Mean Fire Return Interval (Years)	Pre-settlement Fire Regime	Acres	Percentage
11	Dry Mixed Conifer/Yellow Pine	2,500	49%
37	Lodgepole	937	18%
16	Moist Mixed Conifer	664	13%
40	Red Fir	79	1.5%
26	Montane Chaparral	66	1.3%
35	Big Sage	11	<1%
55	Chaparral and Serotinous Conifers	74	1.4%
NA	Non-classified	740	15%
Total		5,071	100%

*Acres are approximate. Percentage based on 5,071 acres

Table 2: Current wildfire return interval by acres in the Robbers Creek project area. *

Current Fire Return Interval (years)	Acres**	Percent
37	23	<1%
55	546	11%
111	4,502	89%
Total	5,071	100%

*Acres are approximate. Percentage based on 5,071 acres
**not including approximately 555 acres of prescribed burning.

Densification and ingrowth by small and intermediate sized trees have changed both vertical and horizontal structure throughout the project area. The diameter distribution has a surplus of small trees with few canopy gaps. High density levels create a high degree of competition between trees for nutrients, water, growing space and sunlight. Closed canopy conditions are not favorable for regeneration (especially shade-intolerant pine) and has also reduced understory vegetation and plant diversity. The closed canopy condition also intercepts more snow, leading to less snowpack and thereby decreasing soil moisture during the growing season. The current homogeneous stand structure is not resilient to fire, disease, insects, or drought.

A lack of disturbance from fire has resulted in degradation of aspen, riparian, and meadow communities in the watershed. Conifer encroachment is threatening the long-term persistence and vitality of these important habitats. Encroaching conifers are outcompeting shade-intolerant hardwoods and meadow understory plant species for light and water. These conditions result in suppressed aspen and riparian hardwood tree regeneration and growth and reduced the abundance and cover of understory plants. These relatively rare but disproportionately important communities are being swallowed up by the surrounding conifer forests. Their loss would greatly reduce the ecological services afforded by this landscape including maintenance of biodiversity, water quality, timing, and yield, recreational values, soil health, and overall ecosystem resilience.

Most aspen stands in the project area are at risk of being lost without intervention. Condition surveys of the aspen stands in the project area found that 97 percent are currently at high risk for loss, and three percent are classified as moderate risk for loss. All aspen communities in the project area are shaded by encroaching conifers. Excessive browsing by deer has led to suppressed regeneration and recruitment in 39 percent of the stands. Additionally, there is a decline in ecosystem services and functions provided by aspen communities, including maintenance of biodiversity, soil moisture, aesthetic and recreational values, and climate resilience. Aspen is among the most bio-diverse habitats in the Sierra Nevada and conifer encroachment reduces habitat value for birds, insects, and other wildlife. Conifer encroachment reduces understory plant community diversity and abundance that contributes to biodiversity and reduces soil erosion. Conifer encroachment in aspen also reduces aesthetic and recreation values of the landscape and reduces resilience of the system to increased fire severity, drought, and other climate change driven impacts.

Multiple meadows exist within the project area and most have either conifer encroachment or degraded hydrologic function, or both. In their current condition they are not in a stable state and are unlikely to self-repair. The extent of conifer encroachment has shaded hardwood and understory plants and reduced soil moisture resulting in a decline in the vigor of these important community elements. The decline in the vigor of deep-rooted sedges has reduced stream bank stability resulting in channel incision, further drying the meadows and improving conditions for increased conifer encroachment. This process threatens the resilience of these important wetland features. Large wood is lacking in many reaches and historically played an important role in providing grade control and bank stability in this system.

Desired Conditions:

Our desired conditions are based on the community structure and composition we would expect under a more natural frequent fire regime. The configuration of forest structure that has developed under the influence of the historic fire regime meets the desired conditions for health and resiliency. The historic fire regime was characterized by frequent mixed severity fire dominated by low-to moderate severity effects. These fire regime-maintained forests were characterized by low stand densities with larger, fire-resistant tree species intermixed with pockets of tree regeneration and shrubs. Stand and landscape heterogeneity is a key component of the forest health and resiliency we desire to restore.

Forest stands would be comprised of high levels of horizontal and vertical diversity at the landscape scale with an increased proportion of fire-resistant pines. Stands would be multistoried consisting of a more even distribution of size classes by reducing the proportion of small trees and increasing the proportion of large trees (North et. al 2009). It is also desirable to have canopy openings throughout the project area to create horizontal heterogeneity. Canopy gaps would promote regeneration of shade-intolerant conifers that compete better under direct sunlight conditions (Helms 1988), and promote understory plant communities (e.g. grass, forbs, shrubs). Heterogeneity would be increased within and among stands allowing individual trees and forest stands to better cope with drought stress, insect infestation and

disease outbreaks and would modify landscape –level fire behavior by reducing the spread and extent of high severity fire.

Aspen and riparian communities would be modified to favor these shade-intolerant hardwoods in multiple size classes. Meadows would be hydrologically functional, with improved growing conditions for riparian hardwoods. Streamside zones would support dense patches of willow, alder, and other meadow hardwoods, providing bank stability, shade to the stream, and high-quality wildlife habitat. Small amounts of large conifers would be retained within the riparian and meadow areas to recruit instream large woody debris and help stabilize the stream. Aspen, riparian, and meadow communities would support an abundant and diverse understory plant assemblage and increased soil moisture.

Need for Action:

The degraded communities within the project area are highly unlikely to self-correct to achieve the desired conditions. Thus, intervention to promote the desired conditions is necessary. There is a need to improve forest stand heterogeneity at the local and landscape scale in the project area to allow the forest communities to better cope with drought, wildfire, insects, and disease outbreaks, and to enhance habitat quality. Based on the existing conditions, there is a need to reduce conifer densities to enhance growing conditions for shade intolerant hardwoods and restore associated understory vegetation in each community and protect aspen and meadow hardwood regeneration from browse. There is also a need to recruit more large wood into Robber's Creek to reverse channel degradation and improve instream habitat conditions (see maps 1 and 2).

Purpose and Need 2: Reintroduce fire into a fire-adapted ecosystem.

Existing Condition:

Fire suppression and past management have not only altered forest structure but also the associated fire regime. Dense forested stands occur throughout the project area creating a coarse grained (characterized by larger, more defined patches) landscape structure. Most of the project area has not experienced wildland fire in over 100 years. Fire-exclusion has greatly increased forest fuel loadings and continuity across all fuel profiles (surface, ladder and canopy). In addition, conifer dominance has shifted to fire-intolerant trees which together with climate change increases the probability of large-scale, high severity fire. If a wildfire were to occur in the project area the effects would likely be higher severity, with greater overstory tree mortality, than would have been expected historically.

Desired Conditions:

Forests resilient to fire would have tree densities reduced to a level conducive to maintaining forest health. Forest structure would be open and dominated primarily by larger, fire-tolerant trees creating a more heterogeneous landscape structure. Surface fuel loading would allow fire to burn at decreased intensities than would occur under current conditions.

The mechanical manipulation of the forest structure would allow for the return of the historic fire regime that was characterized by frequent mixed-severity fire (dominated by low and moderate severity effects) resulting in both landscape and stand scale heterogeneity in forest and fuel structure.

Achieving the desired condition in the project area would allow for the use of prescribed fire across the landscape as a tool to promote forest conditions that are more resilient and less capable of sustaining large scale stand-replacing fire. Use of prescribed fire would also help restore ecological processes that include opening growing space, providing a flush of soil nutrients, and increasing plant diversity, while maintaining desired forest structure. The desired condition would also enable forests to withstand the effects of unplanned fire ignitions while remaining largely intact, due to decreased intensity and rates of spread. This would also allow for more effective fire suppression.

Need for Action:

Based on the current stand structure and predicted fire behavior, there is a need to reduce surface, ladder, and canopy fuels to reduce the size, intensity, and severity of future wildland fires across the project area. Recognizing that fire was a key landscape process that shaped forest patterns at stand and landscape scales, there is a need to re-introduce fire as a process. Utilizing underburning on the landscape would reduce surface fuels, and help restore and maintain ecosystem structure, composition, and function (see maps 1 and 2).

Purpose and Need 3: Restore the hydrologic function of Swain meadow.

Existing Condition:

Swain Meadow is predominantly a low gradient (<1%) riparian hydrogeomorphic meadow type. Multiple, oversized stream channels are present throughout the majority of the meadow. The capacity of these channels is three to four times greater than expected, reducing the frequency, duration, and magnitude of floodplain inundation during high flow events. The increased energy from flood waters contained in these larger channels has destabilized them, resulting in increased erosion and an unstable negative trending condition. Smaller sized channels with consistent riffle[1] pool morphology are present on the floodplain but are only activated during high flow events. The primary channel is deepening and widening at the upstream end of the meadow threatening to further degrade this relatively functional portion of the meadow. Headcuts are present adjacent to the existing oversized channels and are advancing into the floodplain.

Channel incision has resulted in drying the meadow and inhibiting floodplain function. The meadow surface is dominated by more xeric tolerant wetland species and existing structure and recruitment of riparian shrubs is limited, reducing habitat quality for wildlife. Two roads disconnect flows; one is raised

[1] A riffle is an area of a stream characterized by shallow depths with fast moving water.

and bisects the meadow and the other has created an artificial channel feature along the meadow margin. Several ditches capture hillslope discharge along the western edge of the meadow. During dry years Robber's Creek runs dry within the meadow.

Desired Conditions:

The desired condition for Swain meadow is a series of channels with reduced capacity with a series of riffles and pools that are self-sustaining. The floodplain will inundate during high flows on average every 1.5 years. Stream channels with stable non-eroding banks will not contribute elevated sediment load. Increased ground water levels promote wetland obligate plants (e.g. sedges). Flood flows are attenuated, increasing the time before they reach Mountain Meadows Reservoir and Robber's creek which sustains perennial flow in most years through the meadow. Spring runoff floods deposit sediment and seeds on the floodplain promoting willow and other riparian shrub establishment. Dense stringers of willow, surrounded by areas of standing water or saturated soil occur through July, to support breeding habitat for Willow Flycatcher and other meadow associated bird species.

Need for Action:

Without action, Swain meadow will continue to degrade, reducing the ecological services it can provide. There is a need to implement restoration treatments to improve hydrologic function and meadow habitat conditions. Riffles need to be reconstructed to reconnect the oversized channels with the floodplain, raise ground water levels, improve instream habitat, reduce sedimentation in the stream, and to reactivate the floodplain during moderate flow events. Restoring floodplain function and water table elevation will in turn promote Willow Flycatcher and other wildlife habitat, increase net soil carbon sequestration, reduce erosion, attenuate flood flows, and increase the duration of flows during the dry season, increasing aquatic habitat refugia (see map 1).

Purpose and Need 4. Provide an efficient transportation system that meets resource management needs while reducing adverse ecological impacts associated with roads.

Existing Condition:

The current transportation system within the project area consists of National Forest System (NFS) roads, unauthorized routes, and a county road (A-21). Field review of the Robbers Creek Project was completed to determine the most efficient transportation system needed for project implementation. In addition, an inventory of road maintenance needs and improvements to reduce adverse ecological affects was completed as well as a consistency review of the proposed road improvements with the Lassen National Forest Motorized Travel Management Record of Decision (ROD), 2010.

Desired Conditions:

A transportation system that meets resource management needs provides for the following:

- Effective access for logging and mechanical equipment for the implementation of the proposed Robbers Creek Project
- Access for ongoing land management activities
- Safe public access that contributes to economical and efficient management of NFS lands.
- Decreased number of roads that are causing resource damage
- Compliance with the appropriate Best Management Practices

Need for Action:

Roads play a vital role in providing access for resource management, wildland fire suppression, and public use. There is a need to minimize and begin to reverse adverse ecological impacts from roads and to comply with the LNF Motorized Travel Management ROD, 2010. In addition, there is a need to determine and provide for the minimum sustainable forest transportation system that best serves the current and anticipated management objectives; provides for safe public access and travel; and, contributes to economical and efficient management of the road system. A review of the current transportation system shows (see map 3 and 4):

1. There is a need to provide access for current and anticipated management needs.
2. There is a need to add some non-system routes to the NFS system for long-term future management and public use.
3. There is a need to decommission system and non-system roads not needed for future management activities to meet resource objectives, to comply with the LNF Travel Management ROD (2010), and to address adverse effects to the watershed.
4. There is a need for temporary roads to meet project objectives

Purpose and Need 5: Reduce hazardous fuels along PG&E transmission line.

Existing Condition:

Approximately 2.7 miles of a Pacific Gas and Electric Company transmission powerline runs through the Robbers Creek Project Area. The current forest conditions where these lines occur is described in the Purpose and Need 1 above. The excessive tree density and fuel loads increase the number of live, dead, dying and structurally defective trees, which pose a hazard to the powerlines that bisect the Robbers Creek Project. Trees, upon striking a powerline, can initiate wildfires and cause power outages to local communities. The windy conditions that can cause trees adjacent to powerlines to fail also can contribute

to problematic fire spread. On the Lassen National Forest, high wind events typically come from the north, which also historically brings another critical fire weather condition of low humidity. Forest stands in the project area adjacent to the powerline present a risk to the surrounding communities' power source. Powerlines damaged by falling trees present a potential fire ignition source, especially under extreme wind events, thus putting the local community and desired conditions in the watershed described above at risk.

Desired Conditions:

Within 300 feet of the powerlines, fire-resistant conifers would occur at low densities with minimal amounts of surface fuels that would produce low intensity wildland fire behavior. Healthy, structurally sound conifers, resistant to fire (e.g. pine), would make up the majority of the conifers retained.

Need for Action:

There is a need to reduce forest densities and hazard trees adjacent to power lines to reduce the risk of unplanned ignitions and power outages for Westwood and surrounding communities (see map 2).

Proposed Action

The following list of proposed actions is based on extensive field review of the Robbers project area which began in 2009. This list may be expanded or modified based on public collaboration. The Proposed Action was designed to meet the five Purpose and Need statements discussed above. Treatments include mechanical thinning, hand thinning, prescribed burning, machine and hand piling, mastication, meadow hydrologic restoration, construction of temporary roads, repair and maintenance of system roads, and decommissioning of National Forest System roads and non-system roads. In addition to project specific proposed actions described below, the District would implement integrated design features (IDFs see pg. 24). IDFs are intended to minimize potential for adverse resource effects. Table 3 and Table 4 list the treatment type and acres for the proposed management activities and Table 5 summarizes the proposed road activities.

Table 3: Purpose and Need 1, 2 and 5 - Vegetation treatment types in the Robbers Creek Project Area

Treatment Type	Acres
Upland Forests (A)	**2545**
Mechanical thin (follow up machine pile/chip and haul, pile burn or underburn)	2048
Mechanical thin Medow Ecotone (follow up machine pile/chip and haul, pile burn or underburn	206
Hand thin only (follow up hand pile, pile burn and underburn)	16
Northern Goshawk Protected Activity Center (PAC) - hand thin, hand pile, pile burn and underburn	275
Aspen and Riparian Hardwoods (B)	**630**
Aspen Mechanical thin (follow up hand thin, hand pile, pile burn and underburn)	613
Riparian Hardwood Mechanical thin (follow up hand thin, hand pile, pile burn and underburn	16
Hand thin only (follow up hand pile, pile burn and underburn)	1
Meadows (C)	**424**
Mechanical thin (follow up hand thin, hand pile burn, pile burn and underburn)	383
Hand thin Meadow (NOGO PAC)	3
Hand thin only (follow up hand pile, pile burn and underburn)	38
Reintroduce Fire (D)	**973**
Underburn only	926
Underburn only in northern goshawk PACs	47
Total	4745

Note: Acres may vary slightly during the final layout due to topography, stand condition, and rounding, etc.

Table 4: Purpose and Need 4 - Swain Meadow hydrologic function improvement

Actions	#/Acres/Miles
Meadow Hydrologic restoration	174 ac
Riffle Augmentation	2.7 miles
Beaver Dam Analog	20 locations
Borrow Areas	2 sites
Lowering and Aggrading Roads and Ditches	0.22 miles

Table 5: Summary of road actions proposed in the Robbers Creek Project Area

Proposed Action	Miles
Add non-system route to National Forest System (NFS) Maintenance Level (ML)1 (administrative use, closed to the public)	0.17
Add non-system route to NFS ML2 (public use for high clearance vehicles)	0.26
New road construction, add to NFS ML1	0.30
Decommission NFS ML2 roads	0.48
Decommission non-system routes	10.78
NFS ML2 Road reconstruction	1.06
New temporary road construction	7.0

Improve forest health and resiliency across the landscape

Vegetation Treatments

Improve stand structure and species diversity of mixed conifer and east side pine forests to reflect a more fire adapted and resilient ecosystem. Treatment would include thinning (mechanical and hand), piling activity created and surface fuels (machine and hand), and prescribed fire (pile and underburning) (see maps 1 and 2).

Upland Forest

Concepts from the Pacific Southwest Region General Technical Reports (GTR), An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests (GTR 220) and Managing Sierra Nevada Forests (GTR 237) would be applied to meet the desired conditions for the project area. Trees would be thinned using a modified thin from below prescription to vary density throughout a treatment unit. Trees would be retained in groups separated by moderately treed or open gap conditions to create a mosaic stand structure. Variable density thinning would encourage horizontal and vertical structural diversity.

In areas proposed for mechanical treatment, ground-based equipment would be utilized on slopes up to 35 percent to harvest merchantable trees less than 30 inches diameter at breast height (DBH). Unit 144 would be an exception and mechanical harvesting would be allowed on slopes up to 45 percent (see IDF #68, pg. 31, see map 2 of 4). Whole-tree yarding would be used when possible. Hand treatments would occur within these units in areas where equipment cannot be used such as in rocky or steep slopes and streamside areas. Follow up hand treatment or mastication would also occur post-mechanical treatment to cut non-merchantable trees. Hand treatments include felling trees less than 30 inches DBH, lopping and scattering or piling and later burning. Activity generated landing slash would be machine piled and burned or chipped and hauled to a biomass facility. Units proposed for hand thin treatment only are found in areas which have slopes greater than 35 percent or are within sensitive riparian areas. Hand treatment would focus on removing trees that are ladder fuels to larger trees. Trees generally up to 12 inches DBH would be thinned, piled and piles burned.

Within treatment areas, trees 30 inches DBH and larger would be retained within the limits of safety and operability. Any of these larger trees that are felled for safety and operability would be left on site for wildlife and other resource considerations. Trees 30 inches DBH and larger that are cut for establishment of new roads would be removed and not left on site. All snags would be retained within the limits of safety and operability.

Trees that are suppressed, of considerably poor health, or appreciably diseased would be removed in favor of retaining healthy trees, unless otherwise retained for wildlife value. Healthy, shade-intolerant pine

(ponderosa, sugar, and Jeffrey) and Douglas-fir would be favorably retained over shade-tolerant white fir trees and fire-intolerant lodgepole pine.

Variable density thinning (VDT) is a compilation of various thinning treatment components: a) dense clumps of trees, b) canopy openings where few or no trees exist, c) the matrix – areas between clumps and openings with varying tree densities. A percentage of smaller trees would be left for structural diversity. Residual tree density within the matrix and the placement of clumps and openings would be influenced but not dictated by topography such as slope, slope position, and aspect in addition to microsites (unique topographic features). Variable density thinning would promote heterogeneity within stands and across the landscape by increasing vertical and horizontal diversity (a mixture of clumps, openings, and matrix) that provides a variety of wildlife habitat elements, while creating a fire-resilient stand (reduction in canopy continuity, surface and ladder fuels). Canopy cover and basal area would be highly variable across treatment units but would follow the Standards and Guidelines in the Forest Plan, as amended by the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD, USDA 2004). Wildlife structural diversity patches would be captured in the clumps and openings as part of the variable density thinning design prescription. Table 6 lists the design criteria for the mechanical thinning treatments.

Piling operations would occur where predicted surface fire behavior exceeds desired conditions. Generally, down woody surface fuels 3 inches in diameter or less would be less than 5 tons per acre. Surface fuels 3 inches in diameter and larger would be reduced to 15 tons per acre. Surface fuel 12 inches in diameter and larger would be favorably retained over smaller material. Activity-generated and existing surface fuels would be piled using a machine with a grapple style attachment or a dozer fitted with a brush rake.

Table 6: Design criteria for mechanical thinning actions in upland forest

Criterion	Design
Mechanical Thinning	Mixed conifer CWHR types* 4M, 4D, 5M, 5D, and 6 • Retain 40% of existing Basal Area. • Retain 40-50% canopy cover • Avoid reducing canopy cover by more than 30% • Post-treatment densities would range 120 to 160 square feet of basal area per acre.
	East-side Pine CWHR types 4M, 4D, 5M, 5D, and 6 • Retain 30% of existing Basal Area • Post-treatment densities would range 60 to 100 square feet of basal area per acre.
VDT Clumps (dense groups of trees)	Clumps range in size from 5 to 10 trees up to 1/4 of an acre. • Cover up to 15% of each proposed treatment unit. • Comprised of intermediate to large dominant, codominant trees, preferably shade-intolerant conifers depending on species composition. • Generally higher basal area and canopy cover than stand "average." • It is appropriate for trees to have interlocking crowns. • Incorporate wildlife habitat trees (e.g. those with forks, crooks, existing cavities, brooms, nests and snags). • Ladder fuels removed to reduce potential torching. • Desired residual canopy cover >50%. • Retain clumps in irregular shapes.
VDT Openings	Openings vary in size from 3 to 5 trees up to 1/4 of an acre. • Cover up to 15% of each proposed treatment unit. • Expand/enhance existing openings dominated by desired conifer regeneration. • Create around or adjacent to dominant/codominant shade-intolerant conifers, desired seed sources, legacy trees or clumps of these trees (trees generally >24" DBH) • Establish where existing structure is generally uniform and lacks structural diversity. • Utilize shrub species as anchor points for creation of openings. • Create openings with irregular shapes.
VDT Matrix Thinning (areas between clumps and openings)	Variable tree spacing and densities. • Healthy, fire resistant shade-intolerant conifers (pine species, Douglas-fir) within all size class would be preferentially retained along with scattered shade-tolerant trees. • Thinning would occur through all size classes <30 in DBH, but would focus on removing suppressed and, intermediate trees, and trees of poor health and vigor. • Canopy cover would range from 30-60% (depending on existing conditions), averaging approximately 40-50% across the treatment unit. • Increased tree removal around fire-resistant legacy trees (generally >24 in DBH) to provide protection from torching. • Release of hardwood species, shrub species and understory vegetation.
Follow-up Treatments	Grapple piling, mastication, hand thinning, hand piling and/or underburning may follow initial treatment if needed to meet project objectives.
Down Woody Material Retention	Emphasize retention of wood in the largest size classes and in decay classes 1, 2, and 3

* CWHR – California Wildlife Habitat Relationship codes: 4=average tree size small (11-23.9 inches DBH); 5=average tree size medium to large (24.0 inches DBH and larger); 6=multi layered size 5 over size 4 or 3 (pole size trees 6-10.9 inches DBH); M=canopy cover 40-59 percent class; D=canopy cover 60-100 percent class.

Aspen and Riparian Hardwoods

There are approximately 21 aspen stands within the Robbers Creek Project area. To enhance the growing conditions and increase sunlight for aspen and other riparian hardwoods, competing and overtopping conifer trees would be removed. Treatment would include hand thinning, hand piling, dry season mechanical treatment and over-snow mechanical treatment. Aspen treatments would occur within 200 ft. of delineated aspen stands to allow more sunlight to reach stands and allow for stand expansion. A total of 614 acres of aspen would be treated with an additional 16 treated acres of other riparian hardwoods (cottonwood, willow).

Some conifers would be retained in aspen and riparian hardwood areas at densities between 20-60 square feet of basal area. Conifers would be retained using the following indicators: fire tolerant species, presence of fire scars, and proximity to old stumps/snags/or logs, where they do not impede the growth of aspen or riparian hardwoods and would provide future coarse woody debris input to streams. The largest conifers would be preferentially selected for retention and where they occur in clumps or groups. All snags would be retained within these areas, within the limits of safety and operability.

Where aspen and riparian hardwood treatments occur along Robbers Creek, conifers would be retained to contribute to the long-term recruitment of large wood. Large wood in the stream contributes to the geomorphic function and dynamism of Robbers Creek. Between 5 to 10 percent canopy cover of conifers would be retained where they may contribute to the long-term recruitment of wood in the stream. In addition, some conifers would be hand felled strategically to increase large wood in the stream. Directional placement of trees would occur in reaches deemed deficient in coarse woody debris or where placement of wood would enhance stream bed and bank stability as identified and directed by a watershed or aquatics specialist.

Temporary livestock or wildlife fences would be constructed around aspen stands to protect new shoots that are being heavily browsed until they grow above the browse line (e.g. 5 feet for livestock and 6 feet for wildlife). These fences would be utilized to either deter or exclude livestock or wildlife so that new aspen shoots can establish and recruit into larger size classes. Exact locations would be identified post implementation after utilization has been determined in each stand.

After mechanical and hand thinning treatments have been completed, prescribed fire would be allowed to back into aspen stands during prescribed burning operations in adjacent uplands. Any fences installed prior to underburning actives would be protected.

Meadow

Approximately 597 acres of meadow habitat have been identified in the Robbers Creek project area. To increase the extent of these meadows and improve their overall function, encroaching conifers would be removed via a combination of hand thinning, hand piling and burn, lop and scatter, dry season mechanical treatment, over snow mechanical treatment, and/or prescribed fire. Integrated design features would

minimize disturbance to soils and reduce rutting or other damage to the meadow area during implementation (see Integrated Design Features).

The recoverable extent of the meadow footprint was determined during field visits and meadow boundaries were defined using a global positioning system (GPS) receiver. In addition, meadow assessments were completed using the *Meadow Condition Scorecard* (American Rivers 2012)**.** The meadow footprints were identified using both topographic indicators of a slope break and the presence or absence of wetland associated plant species. Conifer removal would occur throughout the delineated recoverable meadow area.

Some conifers would be retained to promote geomorphic function and dynamism of streams within the meadow areas. Between 5 to 10 percent canopy cover of conifers would be retained where they may contribute to the long-term recruitment of wood. Conifers that meet the following criteria would be preferentially retained: located where they would fall into the stream, have fire scars, are near old stumps/snags/or logs, are not shading riparian hardwoods, and the largest trees in the area. Snags would also be retained within the meadow area, within the limits of safety and operability.

Dry season mechanical tree removal would occur within the meadow area where soils are dry to 10 inches. Over-snow mechanical tree removal would only occur when snow conditions and depth are sufficient protect soils from compaction. Conifers less than 30 inches DBH would be removed throughout the meadow area. Where mechanical treatment is not feasible due to soil conditions, hand thinning conifers would be applied. Boles greater than 10 inches DBH would be felled and left within the meadow as large down woody debris. Boles less than 10 inches DBH would be bucked, hand carried, and hand piled outside the wet meadow area (with the exception of meadow unit 504, where piles may be burned in areas of the wet meadow see inset map 1 of 4). Piled material resulting from the conifer removal, would be burned.

Directional placement of trees would occur in reaches deemed deficient in coarse woody debris or where placement of wood would enhance stream bed and bank stability as identified and directed by a watershed or aquatics specialist.

Underburning (excluding units 520 and 501see map 1 of 4), and hand thinning and lopping within meadows would be considered as a secondary treatment to reduce conifer regeneration, promote herbaceous vegetation, and reduce fuels. Underburning or hand treatments in meadows would occur as a maintenance strategy to control future conifer regeneration. Underburning would take place after mechanical and hand treatments and timed to allow for the break-down of project generated fuels. Underburning would occur in the fall, when meadow grasses are dry enough to allow for fire to carry. Meadow units may be temporarily rested from livestock grazing to meet vegetation management goals that would enable prescribed burning. Meadow monitoring would be conducted annually to determine if resting each meadow to reach optimum levels of vegetation for burning conditions and/or recovery is

needed. If resting a meadow is warranted, fences would be used to temporarily exclude livestock to allow for desired meadow vegetation conditions. Livestock could be excluded for a period anticipated to be at least one growing season prior and two growing seasons following burning.

Fences, large boulders or other structures would be strategically placed in some areas to protect meadows and vernal pools from damage caused by unauthorized motor vehicles. The existing 550 ft. fence between Road 30N07 and the Swain vernal pool would be repaired. New fence construction would extend the fence an additional 1250 ft. along Road 30N07. Boulders would be placed to block vehicular access at the southern edge of the pool.

Northern Goshawk PAC Hand Thin Only

Hand thinning would occur on approximately 275 acres of Northern Goshawk Protected Activity Center (PAC). Conifers less than 6 inches in diameter would be hand thinned and piled, existing surface fuels up to 12 inches dimeter would also be piled for burning. After piles are burned, underburning would be utilized to meet desired conditions.

Prescribed Fire

Prescribed fire would occur as a stand-alone treatment in some stands (973 acres, including 47 acres of Goshawk PAC) and as a follow-up treatment in others (3568 acres). After mechanical and hand thinning treatments in upland forests, aspen stands and meadows, underburning would be used to promote snag development and promote shade-intolerant species like ponderosa and Jeffrey pine while reducing species less resilient to fire like white fir and lodgepole pine. Integrated design features address resource protection measures in areas where high intensity fire is undesirable. In these areas direct ignition would be excluded, however fire would be allowed to move into these areas on its own. In areas of the project that currently meet desired ladder and crown fuel conditions, prescribed burning would be a stand-alone treatment to maintain those conditions (see Table 9). The following section describes the specific objectives for underburning in various treatment areas, Table 7 summarizes these objectives (see maps 1 and 2).

Table 7: Objectives for underburning

Post Mechanical Thinning	
Upland Forest	Promote shade intolerant/fire resilient species recruitment Promote understory vegetation Maintain large wood within stands while reducing surface fuel loading Promote snag development - allow up to 10% mortality of live conifer basal area (square feet per acre)
Aspen	Stimulate aspen regeneration Protect roots from high residual heat Protect fencing from fire damage
Meadows	Eradicate lodgepole regeneration
Post hand thinning	
Northern Goshawk PAC	Promote snag development – allow up to 15% mortality of live conifer basal area (square feet per acre)
Underburn only	
Previously thinned	Promote shade intolerant species reproduction Deter regeneration of shade tolerant species Maintain large wood within stands while reducing surface fuel loading Promote snag development – allow up to 15% mortality of live conifer basal area (square feet per acre)

Control lines would be constructed for prescribed burn operations, except where existing roads, skid trails, or natural barriers would serve as control lines. Control lines would not be constructed in wet meadows or where meadow vegetation is present. Along control lines existing snags may be dropped where they pose a safety risk or for prescribed burn control.

Underburning is proposed on a total of approximately 2545 acres as a follow-up treatment in upland forests. Within the mechanical treatment areas, underburning would be used to reduce surface fuels and stimulate and increase density and diversity of understory species. Underburning would promote snag development by allowing for up to 10 percent basal area conifer mortality to occur as a desirable outcome. Less desirable conifers are more prone to fire induced mortality, thus meeting the objective to promote shade intolerant/fire resilient species while also promoting snag development.

Underburning is proposed on a total of approximately 630 acres as a follow-up treatment in aspen and riparian hardwood areas. To prevent excessive aspen mortality and damage to the root system, fire would be allowed to back into aspen and riparian hardwood stands. Active lighting within aspen stands may occur if it is determined that doing so would not cause excessive aspen mortality, compromising the stands ability to recover. Underburning may help to stimulate aspen regeneration, however the best window to promote regeneration is immediately after mechanical thinning. If this cannot be achieved, it is desirable to wait until the majority of the “post mechanical thinning” regeneration is above 5 feet tall.

Underburning is proposed on a total of approximately 394 acres as a follow-up treatment in meadow areas. The main purpose for underburning in meadows is to diminish lodgepole seedling establishment following mechanical thinning. Multiple entry burning after each pulse of seedling growth is expected to moderate lodgepole regeneration and allow the meadow to persist in the long-term with limited encroachment of lodgepole. Burning would occur in the dry season and in years when grazing has not

reduced surface fuels so that fire would be able to burn through the meadow. Fire would be of high enough intensity to kill lodgepole seedlings between 1 and 3 feet tall. As an alternative to underburning, hand cutting and lop and scatter of regenerating lodgepole would be used where underburning is unfeasible or where underburning would result in undesirable loss or reduction of riparian hardwoods.

Underburning is proposed on a total of 278 acres as a follow-up treatment in two Northern goshawk PACs (units 141, 159, 426, 427, 536 and 521 see maps 1 and 2 of 4). Underburning is proposed as a stand-alone treatment on 47 acres of Northern goshawk PAC, in unit 191 (see map 2 of 4). Within the goshawk PACs, underburning would be used to promote snag development and ultimately the long-term development of large logs. Because hand thinning would retain higher stand basal area, it is desirable to allow up to 15 percent basal area (square feet per acre) mortality of the existing live conifers to increase stand complexity and promote habitat for goshawk prey (e.g. small mammals, birds).

Underburning is proposed as a stand-alone treatment on 926 acres. These acres are planned as underburn only due to the existing fuel and forest conditions within the units. The conifer overstory in these units already meets desired conditions as a result of past treatments. Surface fuel loadings are lighter with fewer ladder fuels present than units that are proposed for mechanical treatments or hand thinning. Prescribed fire would be used to maintain surface and ladder fuel conditions, increase snag recruitment, and encourage recruitment of understory species.

Prescribed fire would not be utilized within the Swain meadow restoration area units 501 and 520 to allow for planned revegetation efforts to establish (see map 1 of 4).

Restore the hydrologic function of Swain meadow

Riffles reconstruction (hereafter referred to as riffle augmentation) and Beaver Dam Analogs (BDA's) would be used to restore hydrologic function within Swain Meadow. Existing degraded riffles would be rebuilt, and new riffles would be added to multiple large oversized channels and a smaller western channel to reestablish riffles of similar composition prior to degradation. Several BDA's would be constructed in Swain Meadow, primarily downstream of existing beaver dams and where willows are present. Both techniques (riffle augmentation and BDA's) would seek to utilize native materials to reconnect the stream to the floodplain. This approach would restore the physical processes within Swain Meadow responsible for formation of the meadow.

Artificial roads and ditches would be recontoured to match natural topography to avoid capturing surface and subsurface flows and otherwise altering the natural hydrology of the meadow. Riparian deciduous shrubs (e.g. willow, spirea, dogwood) would be established along existing and remnant stream channels. Additionally, a wood component would be added to the meadow by falling conifer trees along the meadow margin. Access to the site is available from County Road A21 and Forest Service roads on the western and eastern sides of the meadow.

Information from the Swain Meadow Concept Restoration Design Plan (Forest Creek Restoration, Inc., hereafter referred to as the "Design Report") was used to develop the proposed action and is hereby

incorporated by reference. The Design Report describes the restoration proposal and specific methods in detail. The following sections provide a summary (see map 1 of 4, unit 501).

Riffle Augmentation:

Within the oversized channels and smaller western channel, riffle augmentation would be used to raise the base elevation of riffles. About 14,500 feet of channel would be treated with approximately 393 riffles. Riffles would be constructed approximately every 25-30 feet along each channel and vary between 0.3% and 1.0% slope. The placement of the riffles would utilize areas where existing riffles are present and areas of higher base elevation along each channel. Riffle construction would be done by using heavy equipment to place soil/sod mix in riffle areas to set the channel base elevation approximately 0.5'-0.8' below the top of the bank. A slight concave shape would be developed into the riffle to concentrate flows to the center of the structure. Biodegradable jute fabric would be placed and staked on about 25-75% of reconstructed riffles.

For each riffle, existing sod within the channel would be removed, then alluvium from nearby borrow areas would be transported with heavy equipment and added to each riffle. Sod removed from the channel would then be placed back to reconstruct the riffle. In instances where more sod is needed, sod would be removed from gully reaches and adjacent floodplain areas. Other sensitive resources (e.g. plants) would be avoided when sod from the floodplain is removed. When material is removed from the floodplain, it would be done in patterns similar to geomorphic features (i.e. meander scars).

Beaver Dam Analog:

Approximately 20 BDA's would be built within the existing channel of Robbers Creek, most located in the upper reaches of Swain Meadow and a few located in the lower reach. BDA structures would be built by hand, each consisting of approximately 12-15 posts (about 10 feet long and 4-6 inches in diameter). Posts would be made from conifer trees harvested from the surrounding thinning units 185, 201, 204, 205, 423 and 424 (see map 1 of 4). The posts would be driven approximately 3-6 feet deep into the streambed using a hand-held post pounder or a pounder attached to a portable hydraulic powered generator, placed approximately 16-20 inches apart. Once posts are in place, on site willow branches and other native material (e/g/ brush, branches, sod, soil and rock) would be woven and placed between post to protect from scour and reduce water permeability through the structure. The intention of the structures is to either redirect flow to the valley low or remnant channels, or to serve as grade control while passing primary flow over the structure. BDA's serving to redirect flows would be cut equal to or 1-2 inches above the bank height. BDA's used for grade control would be cut slightly lower at the center to mimic the natural concave shape of a riffle, directing greater amounts of the flow to the center.

Borrow Areas:

Borrow areas are necessary to acquire material for riffle augmentation. Two borrow areas are potentially available for use at Swain Meadow: 1) appropriate alluvium generated from a nearby road construction

project and 2) a lodgepole pine site located 0.5 miles east of Swain Meadow where trees would be removed first, then material would be dug and transported to the riffles. A third borrow site, within the project area, may be needed if unanticipated circumstances result in the unavailability of one of the two preferred sites.

Lowering and Aggrading Roads and Ditches:

The road bisecting the meadow would be lowered one foot on average. The material removed from the road would be used as fill nearby as the material appears to be generated from the adjacent floodplain. The artificial channel feature from the road would be treated with intermittent "plugs" to redirect water onto the meadow. Additionally, three linear ditches on the western floodplain margin would be intermittently filled to match adjacent topography and reduce their ability to capture flow and alter meadow hydrology. Adjacent stockpiled material from the construction of the ditch is available to use to refill the ditches.

Planting:

A riparian planting plan would be developed to establish willow and other species along the existing and remnant channels. Locally adapted species and species that are likely to be selected for as the climate changes would be chosen.

Plugs or transplanted sod containing *Castilleja lassenensis* and host plants such as *Potentilla millefolia* would be planted at appropriate elevations for their survival under the new soil moisture conditions.

Placement of Trees:

Small trees (less than 12 inches DBH) would be hand felled across the eastern margin into the meadow, approximately every 100 feet. Trees would be harvested from the surrounding thinning units 185, 201, 204, 205, 423 and 424 (see map 1 of 4). Trees would provide a wood component to the meadow that was historically present, to capture debris and sediment and discourage livestock trailing along the meadow margin.

Fencing:

Following restoration activities, livestock use would be minimized within the restoration area. A drift fence or other allotment adjustments (i.e. rest rotation or pass through) would be used to control timing, duration, and intensity of grazing to allow for the recovery of the riffle augmentation sites and vegetation regrowth of willows and other meadow vegetation.

Transportation management

The existing forest transportation system would be utilized to provide access to treatment units. Road maintenance would be performed on a portion of that system as needed for project implementation (see maps 3 and 4). Approximately 7 miles of temporary roads may be constructed for access during project

implementation. These temporary roads would then be decommissioned upon project completion (see Table 5 and Table 8)

A total of approximately 0.48 miles of existing NFS road would be decommissioned as they are not needed for long-term future management; approximately 10.78 miles of unauthorized routes were determined to have no immediate or long-term future management needs and would be decommissioned. Both the mapped non-system routes as well as any existing un-mapped non-system routes within the project area would be decommissioned (Table 5 and Table 8).

In addition to the existing forest transportation system, approximately 0.30 miles of ML 1 NFS road would be constructed to access treatment units. These new NFS roads would be designed to be out-sloped where possible with self-maintaining drainage structures. ML 1 roads are closed to all motor-vehicle traffic, but retained on the NFS to facilitate future management activities (see Table 5 and Table 8).

Approximately 0.26 miles of unauthorized routes was determined to provide access to two dispersed camping locations and would be added as National Forest System (NFS) roads (maintenance level 2) in order to continue allowing public access (see
Table **5** and Table 8).

Approximately 1.06 miles of road would need reconstruction. This would include the removal of all trees from within the road prism as well as brushing, blading the road surface, improving drainage and replacing/upgrading culverts where needed (see

Table **5** and Table 8).

NFS roads used for haul would receive pre-, during-, and/or post-haul maintenance as per Forest Service Road Maintenance T-Specifications for Timber Sale Contracts. Maintenance items include surface blading, surfacing, clearing for sight distance, installation of rolling dips, and cleaning drainage facilities. The road maintenance on this project would supplement a forest road maintenance program that is currently under-funded. A dust abatement plan would also be included to control wind-caused erosion from road use. A surface replacement deposit collection would be required based on haul volume on any gravel- or cinder-surfaced NFS road.

Table 8: Design criteria for road activities for the Robbers Creek Project

Criterion	Design
Decommission/Obliteration	Decommissioning/Obliteration may involve recontouring subsoiling. removing drainage structures, restoring vegetative cover, blocking access or some combination of these treatments.
New Temporary Roads	Temporary roads, new constructed or existing unauthorized routes, would be used for project work and subsequently restored when the fuels and vegetation management work is complete.
Reconstruction	Reconstruction may involve the removal of all trees from within the road prism as well as brushing, blading the road surface, improving drainage and replacing/upgrading culverts where needed.
New Temporary Roads	Temporary roads would be constructed for project work and subsequently restored when the fuels and vegetation management work is complete.

Powerline Thinning

A Pacific Gas and Electric (PG&E) transmission line bisects the southern end of the project area, passing through the following treatment units; U-150, 153, 166, 167, 172, 173, 182, 302 and 303 (see map 2 of 4). Within 300 ft of the center line both live and dead fuels would be treated in excess of the surrounding units to reduce the risk of damage to the transmission lines resulting in loss of power or a source of ignition for a wildland fire. Two stand improvement treatments are proposed within this area: Removal of hazardous vegetation within 40 feet of center line and a thin from below within 40 to 300 feet of center line.

Within 40 feet on either side of the center line, all incompatible vegetation would be marked for removal. Incompatible vegetation is that which is undesirable, unsafe, or interferes with the intended use of the site. This includes any vegetation that can grow to a height that encroaches into PG&E's minimum vegetation clearance distances, presents a fire hazard, impedes access or obscures the inspection of equipment. In addition, vegetation would be marked for removal that may pose a hazard to the lines within the next five years from grow-in or fall-in. Additional trees and other vegetation may also be marked for removal if they pose a potential threat to the safety or reliability of the line at any time in the future. Well-spaced, healthy vegetation could be left, based on the professional judgment of the inspector that the vegetation would not be a hazard to the lines in the foreseeable future.

Within the area from 40 to 300 feet of the transmission centerline, trees would be thinned from below to reduce stand density for forest health and reduce risk of high-severity wildland fire. The specific elements of the proposed thinning within 300 feet of line are as follows;

- Stands would be thinned from below to a target basal area of 40 to 60 square feet per acre.
- Ground-based logging equipment would be used to remove commercially viable material saw-logs and biomass. Non-commercial trees would be thinned and piled on site.

- In areas inaccessible to ground-based machines, hand thinning may occur.
- All hardwood trees, as well as conifer trees greater than 29.9 inches in diameter at breast height (DBH) would not be cut unless they pose a hazard to the power line.
- Trees would be favored for retention in this order: healthy sugar pine, ponderosa/Jeffrey pine, Douglas-fir, incense-cedar, white fir, lodgepole pine.

Thinning treatments, on their own, may be ineffective at reducing fire hazard in stands with high fuel loads. As a result, surface, ladder, and activity fuels will be treated within 300 ft of the center line using a combination of methods, including pile and burn, mastication, and chipping. Due to the need to reduce surface fuels removal by chipping (and hauling for biomass) is the preferred fuel treatment method, but the others may be used where chip-van access is limited.

Integrated Design Features

The following integrated design features are resource protection measures that are developed by specialists and incorporated as part of the action alternative for the project. They are project-specific and are in addition to Best Management Practices (BMP) and standards and guidelines from the Lassen LRMP, as amended. These design features are also included to provide implementation parameters that would be incorporated into treatments, contracts, or used to guide forest service personnel in conducting implementation activities.

Aquatics and Watershed:

Riparian Conservation Areas

Equipment restriction zones would be established within Riparian Conservation Areas (RCAs) measured from the edge of the stream channel or aquatic feature (**Table 9**). Equipment would be permitted to reach beyond mechanical restriction zone boundaries into the RCA, but not allowed to enter. RCA widths and mechanical restriction zones would be as follows: Note: In limited instances where equipment is needed to create desired condition, mechanical equipment exclusion zones may be modified with the approval of a qualified specialist.

Table 9: RCA widths and overview of mechanical restriction zones (measured from the edge of the aquatic feature)

Aquatic Feature	RCA width	Ground-based mechanical equipment exclusion zone		Burning	
		Slope 20% or less	**Slope greater than 20%**	**Piles (distance from riparian vegetation)**	**Underburn Ignition (distance from aquatic feature)**
Perennial stream	300 feet	25 feet (except units 307 and 309)	150 feet	25 feet	50 feet
Seasonal stream	150 feet	10 feet	50 feet	25 feet	50 feet
Lake, wetland, wet meadow	300 feet	No distance exclusion zone* see IDF 63 pg. 30		25 feet (except unit 504)	variable (see IDFs)
Springs	300 feet	10 feet	50 feet	25 feet	50 feet
Fen	300 feet	150 feet	150 feet	150 feet	150 feet
Swain Vernal Pool (see IDFs for additional restrictions)	300 feet	50 feet for slopes <10%	300 feet for slopes >10%	50 feet where slopes are <10%, 300 feet where slopes are >10%	300 feet
Other Vernal Pools	300 feet	10 feet	50 Feet	25 feet	50 feet

1. Hand felling within the RCA, including within the mechanical restriction zone, would be permitted.

2. Riparian species (aspen, cottonwood, alder, willow, dogwood, etc.) would not be cut or removed except where needed to construct BDAs in Swain Meadow.

3. Stream bank stability trees would be identified by a qualified specialist prior to RCA treatments. Stream bank stability trees would not be felled unless they pose a safety risk, in which case they would be felled and left in place.

4. Turning of mechanical equipment within RCA would be kept to a minimum.

5. There would be no crossing of perennial streams by mechanical equipment. Crossings of seasonal stream channels would be designated by a qualified specialist prior to implementation. Following use of these specified crossings, a qualified specialist would assess the site for potential repair and/or restoration needed.

6. Skid trails within RCAs would be kept to a minimum. No waterbars would be installed on skid trails within RCAs following treatment.

7. Skid trails within RCAs would require 90 percent ground cover following project implementation.

8. Mechanical equipment would be permitted within 25ft of the riparian vegetation along the existing unauthorized route within units 307 and 309 (see map 1 of 4).

9. No cut and fill would be allowed for new skid trails within RCAs.

10. Where mechanical equipment is used to fell timber within RCAs, one-end suspension would be used to remove felled timber where feasible. If one-end suspension is not feasible, endlining would be permitted as long as objectives for 90 percent groundcover on non-rocky riparian soils are met.

11. End-lining of material would be permitted within RCAs with slopes greater than 20 percent but would not be permitted within 25 feet of any continuous scour channels.

12. No piling of material for burning would occur within 25 feet of an aquatic feature except in unit 504 (see inset map 1 of 4).

13. In unit 504 pile burning would be allowed within the aquatic feature (a wetter meadow), and the RCA, with piles no more than 10 feet in diameter and 5 feet high. No more than 10 percent of the aquatic feature would be covered in piles.

14. If piles for burning cover more than 10 percent of the RCA in a unit, only one-third of the piles would be burned in any given year to avoid impacting the nearby riparian environment.

15. There would be no construction of new landings or use of old or existing landings within an RCA without concurrence by a qualified specialist. Landings would not be within 25 feet of the existing riparian or meadow vegetation. Landings within RCAs would be decommissioned following project implementation and a qualified specialist would evaluate them for compaction or erosion potential. Mitigations may include obliteration of the landing, spreading of native seed, mulch, woody debris, or certified weed-free straw.

16. Any wood placement in stream channels would be at the discretion of a watershed or aquatics specialist.

17. Keep the skidded length to a minimum within RCAs.

Water Drafting

18. If streamflow is greater than or equal to 4.0 cubic feet per second, the water drafting rate should not exceed 350 gallons per minute.

19. If streamflow is less than 4.0 cubic feet per second, the water drafting rate should not exceed 20 percent of the streamflow.

20. Water drafting would cease when bypass surface flows drop below 2.0 cubic feet per second.

Botany

Swain Vernal Pool RCA (Orcuttia tenuis, units 139, 177, 304, 307, 309, see map 1 of 4))

21. No mechanical treatments, skid trails, or end lining would occur within 50 ft. of the Swain Vernal Pool edge, although equipment could reach in. Hand treatments would be permitted. Over snow logging would be used if possible, but not required. The pool would be displayed as a control area on contract maps.

22. Trees would be retained within 10 ft. of the southern shoulder of Road 30N07 where practicable.

23. No mechanical treatments would occur on slopes >10% within the Swain Vernal Pool RCA (300 ft.)

24. Hand piles would be placed further than 50 ft. from vernal pool edge and on slopes less than 10% within the Swain Vernal Pool RCA.

25. No landings would be located within the Swain Vernal Pool RCA (300 ft.)

26. Main skid trails would be 100 ft. from vernal pool edge, and on slopes < 20%. Skid trails running parallel to the Swain Vernal Pool edge would be minimized. Mechanical harvest would be required.

27. Spring burning would be permitted prior to pool drying, however no ignition would occur within the Swain Vernal Pool RCA.

28. Road decommissioning activities would be excluded from Swain Vernal Pool.

TES Plant Species

29. The occurrence of *Botrychium minganense* in Unit 5 (see inset map 1 of 4) (BOMI-033) would be protected through flag-and-avoid methods and would exclude project activities within 25 feet. Trees would be directionally felled away from the occurrence. Locations would be displayed as control areas on all contract maps.

30. Live vegetation and snags would be retained within 150 ft. of Bandit Fen, and this location would be displayed as a control area on contract maps.

31. Occurrences of *Silene occidentalis* ssp*. occidentalis* (SIOCO-007, SIOCO-008) would be flagged and avoided by mechanical thinning, hand piling and pile burning activities. Hand-thinning could occur within occurrences, and mechanical equipment could reach in from edges (Unit 302, Unit 309, see maps 1 and 2).

32. Within sub-occurrences of *Carex davyi* less than two acres in size (CADA2-005, CADA2-009, CADA2-010, CADA2-011, CADA2-012, CADA2-013), mechanical equipment, hand-piling, prescribed fire ignition and pile burning activities would be excluded, but hand-thinning could occur and mechanical equipment could reach in from edges (Units 130, 160, 161, 186, 302, 514, 516, 525, 527, 530 see map 1 and 2 of 4). Mechanical equipment would be permitted within occurrences larger than two acres in size (e.g. CADA2-008, Units 134, 160, 319, 429, 511 see map 1 of 4). Prescribed fire would be permitted in all occurrences.

33. Trees greater than 15 inches DBH would be retained within the limit's operability in all occurrences of *Carex davyi*. Trees greater than 15 inches DBH may be removed for operability with prior approval from Forest botanist

34. Vehicular traffic would be restricted to channels within occurrences of *Castilleja lassenensis* and *Botrychium simplex* in Swain Meadow (CALA45-003, BOSI-012).

35. Sod removal associated with riffle augmentation in Swain Meadow would not occur within occurrences of *Castilleja lassenensis* or *Botrychium simplex* (CALA45-003, BOSI-012).

36. Mechanical equipment would be excluded from all occurrences of *Castilleja lassenensis,* but where practicable in Unit 501 (Swain Meadow, see map 1 of 4). Hand-thinning would be permitted within occurrences, but piles would be placed 25 ft. from occurrences or lopped and scattered 25 ft. from occurrences. (Unit 511, Unit 514, Unit 519, Unit 538 see map 1 of 4)

37. Prescribed fire would not be ignited within occurrences of *Botrychium* species or *Castilleja lassenensis,* although fire would be allowed to back into these areas.

38. New occurrences of threatened, endangered, or sensitive (TES) plant species or fens discovered before or during ground-disturbing activities will be addressed as with species-specific protection measures similar to those described above.

Invasive Plant Species

39. All off-road equipment would be weed-free prior to entering the Forest. Staging of equipment would be done in weed free areas.

40. Known invasive plant infestations would be identified, flagged where possible, and mapped for this project. Locations would be displayed on contract maps. Identified noxious weed sites within or adjacent to the project area containing isolated patches with small plant numbers would be treated (hand pulled or dug) by forest botany staff prior to project implementation. Any larger or un-pullable infestations would be avoided by harvesting equipment to prevent spreading weeds within the project.

41. New small infestations identified during project implementation would be evaluated and treated according to the species present and project constraints and avoided by project activities. If larger infestations are identified after implementation, they would be isolated and avoided by equipment, or equipment used would be washed after leaving the infested area and before entering an un-infested area.

42. Post project monitoring for implementation and effectiveness of weed treatments and control of new infestations would be conducted as soon as possible and for a period of multiple years after completion of the project.

Cultural Resources

Cultural Resource protection is managed through the Programmatic Agreement (PA) among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region (2013).

Cultural Resources within the Robbers Creeks project area of potential effect (APE) would be protected during project implementation utilizing the following Approved Standard Protection Measures:

43. Proposed undertakings shall avoid historic properties. Avoidance means that no activities associated with undertakings that may affect historic properties, unless specifically identified in this PA, shall occur within historic property boundaries, including any defined buffer zones.

44. Activities within historic property boundaries will be prohibited with the exception of using developed Forest transportation systems when the Heritage Program Manager (HPM) or qualified heritage professional recommends that such use is consistent with the terms and purposes of this agreement, where limited activities approved by the HPM will not have an adverse effect on historic properties or as accepted otherwise.

45. All historic properties within APEs shall be clearly delineated prior to implementing any associated activities that have the potential to affect historic properties.

a. Historic property boundaries shall be delineated with coded flagging and/or other effective marking.
b. Historic property location and boundary marking information shall be conveyed to appropriate Forest Service administrators of employees responsible for project implementation so that pertinent information can be incorporated into planning and implementation documents, contracts and permits.

46. Linear sites (e.g., historic trails, roads, railroad grades, ditches) may be crossed or breached by equipment in areas where their features or characteristics clearly lack historic integrity.

    a. Crossings are not to be made at points of origin, intersection, or terminus of linear site features.
    b. Crossings are to be made perpendicular to linear site features.
    c. The remainder of the linear site is to be avoided, and traffic is to be clearly routed through designated crossings.

47. Placement of foreign, non-archaeological material (e.g., padding or filter cloth) with transportation corridors over archaeological deposits or historic features to prevent surface and subsurface impacts caused by vehicles of equipment.

    a. Engineering will design the foreign material depth to acceptable professional standards.
    b. Engineering will design foreign material use to assure that there will be no surface or subsurface impacts to archaeological deposits or historic features.
    c. The foreign material must be easily distinguished from underlying archaeological deposits.
    d. The remainder of the archaeological site is to be avoided, and traffic is to be clearly routed across the foreign fill material.
    e. The foreign material must be removable.
    f. Indian tribe or other public concerns about the use of the foreign material will be addressed prior to use.

In addition to the programmatic agreement approved standard protection measures, the following measures would be utilized:

48. The project manager or sale administrator would walk historic property boundaries located within or near activity areas with operators before project implementation to insure protection.

49. Historic properties within or adjacent to planned treatment areas, activity areas, or roads would be monitored during and after project completion.

50. If heritage resources are identified during project implementation (unanticipated discovery) all work would cease immediately in that area until the situation is reviewed and an assessment and mitigation plan instituted to insure protection of the site.

Fuels

51. Hand and machine piles would not be placed in locations that would result in the mortality of surrounding trees when piles are ignited.

52. Machine and hand line would not be constructed within wet meadows.

53. Control lines would be rehabilitated after prescribed burning has been completed and declared out by the appropriate fire and fuels personnel, unless the control line is to be used in a subsequent prescribed burn.

Range

54. Coordination between project manager(s), range specialists, and the affected grazing permittee(s) would occur prior to implementation of project activities.

55. If meadow treatments require temporary livestock exclusion to meet management goals for prescribed burning or restoration, the activities would be staggered so that multiple allotment grazing areas would not be excluded from livestock at the same time (i.e., fenced, burned, rested, or other treatments).

56. Fencing, either temporary or permanent, would consider water availability and livestock trailing needs and movement patterns so as not to cause corridors, funneling or congestion between fences or other barriers.

Recreation/Special Uses

57. Trails and roads accessing dispersed camping areas and trailheads would be kept open and free of debris during implementation of treatments.

58. Designated trails and roads open to the public may be closed for periods of time during project activities to provide for public safety. The proper staff would be notified 14 days prior to closure periods.

59. Seasonal restrictions are in place for winter recreation (cross-country ski, snowmobile) from December 26 through March 31 annually for FS 30N07, FS 30N31, FS29N32Y, FS29N19YA, and FS 29N08B

Silviculture

60. Cut stumps of live conifers with a 14-inch stump diameter would be treated with an Environmental Protection Agency (EPA)-approved borate compound which is registered in California for the prevention of annosus root disease. No EPA-approved borate would be applied within 25 feet of known Sensitive and Special Interest Plants or within 25 feet of live streams and meadow/wetlands.

61. All sugar pine identified as rust resistant or as a candidate for rust resistance would be protected. A $20,000 fine would be imposed for each rust-resistant or candidate tree damaged during operations. Healthy sugar pine showing no observable signs of blister rust would be favorably retained.

Soils

62. Soils in the RCA and in meadow treatment areas would be dry to a depth of 10-inches prior to equipment entry. If over-snow treatments are utilized, snow conditions and depth would be sufficient to protect soils from compaction.

63. In treatment units outside of RCAs, soil moisture conditions would be evaluated using Forest-established visual indicators before equipment operation proceeds. Lassen National Forest (LNF) Wet Weather Operations and Wet Weather Haul Agreements would be followed to protect the soil and transportation resources.

64. Areal extent of detrimental soil disturbance in uplands would not exceed 15 percent of the area dedicated to growing vegetation. Following implementation, the mechanical treatment units would be evaluated by a qualified specialist to determine if detrimentally compacted ground exceeds the LNF Land and Resource Management Plan standard of 15 percent areal extent. If restoration is needed to achieve compliance, an appropriate subsoiler, ripper or other implement would be used to fracture the soil in place leaving it loose and friable.

65. In mechanical treatment units, landings within treated areas no longer needed for long-term management would be evaluated by a qualified specialist to determine whether remediation is needed to restore productivity and hydrologic function. If so, appropriate remediation would be implemented. Where landing construction involved cut and fill, the landing would be re-contoured to match the existing topography.

66. Machine piling operations would remove only enough material to accomplish project objectives and would minimize the amount of soil being pushed into burn piles. Duff and litter layers would remain as intact as possible, and the turning of equipment would be minimized. Piles would be constructed as tall as possible, within limits of safety and feasibility. A mixture of fuel sizes in each pile is preferred, avoiding piles of predominately large wood when practicable.

67. To the extent possible, existing landings and skid trails would be used.

68. Mechanical equipment would not operate on slopes greater than 35 percent. Mechanical harvesting would be allowed in unit 144 (see map 2 of 4) on slopes up to 45 percent. A qualified watershed specialist would be present to monitor initial implementation on slopes over 35 percent.

69. Where it exists, large woody material greater than 20 inches in diameter would be retained at a rate of at least five logs per acre.

Wildlife

Northern Goshawk

70. Existing goshawk protected activity centers (PAC) would be surveyed prior to treatments occurring in the PAC or within ¼ mile of the PAC.

71. A northern goshawk limited operating period (LOP) from February 15 to September 15 would be applied within ¼ mile of all goshawk PAC or within ¼ mile of a nest if a nest is confirmed. The LOP may be lifted if it is determined that the PAC is not occupied.

72. If a northern goshawk nest is found within any of the proposed treatment units, the nest would be protected through the placement of a new PAC or the realignment of an existing PAC boundary.

California Spotted Owls

73. Existing California spotted owl protected activity centers (PAC) would be surveyed prior to treatment and no treatment would occur within an existing or new owl PAC.

74. A California spotted owl LOP from March 1st to August 15th would apply to stands within ¼ mile from a spotted owl PAC unless surveys confirm that spotted owls are not nesting. The LOP would be lifted after surveys if no nesting spotted owls are confirmed.

75. If a California spotted owl nest is found within any of the proposed treatment units, the nest would be protected through the placement of a new PAC or the realignment of an existing PAC boundary.

Marten

76. If a marten den site is identified, a 100-acre area consisting of the highest quality habitat in a compact arrangement would be placed around the den site. The den site area would be protected from vegetation treatments with a limited operating period (LOP) from February 15 through July 31st as long as habitat remains suitable or until another Regionally-approved management strategy is implemented.

77. No mechanical treatment would be permitted within the 100-acre marten den site area regardless of time of year. Hand treatments may be permitted if existing desired conditions for suitable habitat are retained and timing of treatments abide by the LOP.

78. If a marten rest site (female or male) is found within a treatment unit, the rest site structure, (e.g., log, snag, tree) would be protected from being damaged during project implementation.

Fisher

79. If a fisher den site is identified, a 700-acre area consisting of the highest quality habitat in a compact arrangement would be placed around the den site. The den site area would be protected from vegetation treatments with a limited operating period (LOP) from March 1st through June 30th as long as habitat remains suitable or until another Regionally-approved management strategy is implemented.

80. No mechanical treatment would be permitted within the 700-acre fisher den site area regardless of time of year. Prescribed burning or other treatments may be permitted if existing desired conditions for suitable habitat are retained and timing of treatments abide by the LOP.

81. If a fisher rest site (female or male) is found within a treatment unit, the rest site structure, (e.g., log, snag, tree) would be protected from being damaged during project implementation.

Wolves

82. If a den or rendezvous site is found within 1 mile of project activities between March 15 and August 15th, the Forest Service Wildlife Biologist will work with CA Department of Fish and Wildlife and US Fish and Wildlife Service to implement appropriate mitigation measures

Snags and Down Logs

83. In addition to existing snag retention, defect trees (i.e. forked, broken or dead tops) would be retained when wildlife use is evident in the form of existing cavities and nest structures.

84. Between 10 and 15 tons per acre of large down logs (>12 inches in diameter and 6 feet in length) would be retained where it exists. Large log retention can be met with either existing logs; or trees 30 inches DBH and larger and snags cut for safety or operability that would be left on site.

Aspen and riparian hardwoods

85. All aspen and other riparian hardwood trees greater than 8 inches DBH would be protected during operations within the limits of safety and operability.

86. Landings would be placed outside of aspen stands where possible.

87. Burn piles would be placed a minimum of 25 feet away from aspen stems.

Decision to be made

The decision to be made is whether to implement this project as proposed, as modified to address any relevant issues raised during scoping, or not at all. This proposal will be subject to the pre-decisional objection process found at 36 Code of Federal Regulations 218.

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